6.5: Loans and Amortization

Definition.
Amortization is the process of repaying a loan. When we have a debt of A_n, with an interest rate of i per period, amortized by n equal periodic payments (at the end of each period), the size of each payment is

$$R = A_n \left[\frac{i}{1 - (1+i)^{-n}} \right]$$

Example. A company modernizes its production by buying a new piece of equipment for $\$200,000$. It makes a $\$50,000$ down payment and agrees to amortize the rest of the debt with quarterly payments over the next 10 years. If the interest on the debt is 12%,

find the size of the quarterly payments

find the total amount of the payments

find the total amount of interest paid

Example. For the following, calculate the regular payments

$\$100,000$ for 3 years at 9% compounded annually

$\$30,000$ for 5 years at 7% compounded annually

$\$20,000$ for 1 year at 9% compounded quarterly

$\$50,000$ for $2^1/_2$ years at 9% compounded semiannually

Example. Chuckie and Angelica have $\$30,000$ for a down payment, and their budget can accommodate a monthly mortgage of $\$1,200$. What is the most expensive home they can buy if they borrow money for 30 years at 7.8% compounded monthly?

Example. A loan of $\$10,000$ is to be amortized with 10 equal quarterly payments. If the interest rate is 6% compounded quarterly, what is the periodic payment?